

any patient with decompensation can be given an anesthetic safely for an obstetrical operation when the anesthetist is a physician, trained to study and understand signs and symptoms as well as in the mechanics of his art.

#### DISCUSSION

CAROLINE B. PALMER, M. D. (2401 Sacramento Street, San Francisco)—Several points in this paper are of outstanding importance to all who have to do with the choice and administration of anesthetics.

Unquestionably, myocarditis and endocarditis are the most serious forms of cardiac disease in relation to the anesthetic used and the method of administration. In these conditions, as well as in decompensation from any cause, nitrous oxid with a large percentage of oxygen is satisfactory for *analgesia*, but any attempt to produce surgical anesthesia with this anesthetic entails an unjustifiable hazard. These patients cannot bear the limitation of oxygen necessary to induce surgical anesthesia with nitrous oxid and oxygen alone. A decrease of oxygen below 20 per cent is never safe in the class of cases under consideration and often much higher percentages are indicated, as cyanosis should not be permitted for an instant. When the necessity for surgical anesthesia arises, it is far safer to increase the percentage of oxygen and add as small an amount of ether as will produce the desired result.

The importance of doing everything possible to shorten the duration of anesthesia is always worthy of consideration, but in this class of cases it easily may be the determining factor.

It seems to me that the keynote of the paper is the recognition of the value of co-operation between the obstetrician or surgeon and the anesthetist. Without this co-operation the best results are not possible.

H. A. THOMPSON, M. D. (Electric Building, San Diego)—This paper presents a problem that is of great interest and importance to all anesthetists, that of cardiac decompensation.

Whatever the type of lesion present, we must realize we are dealing with an abnormal heart and it may respond in an abnormal manner to any anesthetic.

We have learned that some types of lesions, notably the aortic, are more prone to cause trouble than others, except possibly myocarditis and acute endocarditis.

This seems to be contrary to the author's cases, but has been my experience.

I have had less difficulty with mitral lesions than any other.

I believe the use of gas, owing to the lesser irritation and the ease with which it can be taken, offers many advantages. Here again I believe that ethylene, with the large percentage of oxygen which may be administered with it, up to 30 to 40 per cent, in some cases with a little ether vapor if that may be necessary for complete relaxation, offers the nearest to the ideal anesthetic.

The increased relaxation, over nitrous oxide, offers a marked advantage either for a Caesarean, a version, or a rapid forceps delivery, and the recovery may be brought about rapidly by an increase in oxygen in case of weakening of the heart muscle.

I believe an opiate in small amount aids in quieting the patient, and have not found it gave any untoward symptoms to the baby.

It is very essential to produce anesthesia in a manner free from any stage of excitement, and to maintain as light an anesthesia as may be permitted by the procedure decided on.

I believe that thoughtful consideration of the anesthetist's difficulties and co-operation of the surgeon, combined with a reasonable amount of skill on the part of the anesthetist, will bring most of these very troublesome cases to a satisfactory termination.

A Washington magazine has just closed a contest on "What is a Democrat?" There were 8000 definitions—all different, of course.—Dallas News.

## THE USE OF LOCAL ANESTHESIA ALONE OR COMBINED WITH GENERAL ANESTHESIA IN ABDOMINAL SURGERY

By H. A. L. RYFKOGEL AND EVERETT CARLSON \*

*Local anesthesia has a very important place in abdominal surgery.*

*In certain types of patients, particularly the aged and those whose senses have been obtunded by toxic conditions, extensive abdominal operations can be performed with local anesthesia alone.*

*Local anesthesia can be used alone in certain operations where the disease is limited to a single structure and where a general exploration is not indicated, e. g., appendicectomy, gastrectomy, gastro-enterostomy, gastrotomy, enterostomy, repair of fecal fistulas, hernioplasties, removals of large tumors of the uterus or ovary, some cholecystectomies, some intestinal resections.*

*In many, perhaps the majority of operations, it is wise to combine a light nitrous oxide, ethylchloride or ether anesthesia with the local. Thus, in certain operations such as gastrectomy, only a brief inhalation of gas while separating adhesions or pulling on the mesenteries is necessary. Experience will teach the surgeon what manipulations produce pain, and the inhalation of anesthesia must precede and not follow them.*

*In operations in which the major portion will require the administration of gas, such as all operations in which the diagnosis is not complete and so require exploration, most pelvic operations, the majority of operations on the biliary tract, operations on nervous patients, etc., complete gas anesthesia should first be induced and then the tissues to be incised or manipulated should be thoroughly infiltrated with the local anesthetic. This combined or "anoci-association" is therefore indicated in the majority of abdominal operations. In order, however, to attain the greatest possible success in the method, the surgeon must train himself in infiltration anesthesia by doing as many operations as possible under local anesthesia alone, because the successful use of combination anesthesia in abdominal surgery depends on the thorough local anesthetization of the abdominal wall and other structures.*

*If no pain impulses pass to the central nervous system from the operative field, relaxation during the operation will be complete, and following it shock will be absent.*

DISCUSSION by Frank R. Girard, San Francisco; A. H. Rosburg, San Francisco; A. B. Cooke, Los Angeles.

IN 1883 Alexander Wood discovered the hypodermic needle, and in 1884 Karl Koller first used cocain as a local anesthetic in surgery. In 1885 Corning showed that by interrupting the circulation very dilute solutions could be made to produce prolonged anesthesia. In 1900 Braun, having learned that injections of suprarenal extract would slow or almost interrupt local circulation, experimented on himself with combinations of this material and cocain, and showed that the anesthetic effect of solutions of cocain were thereby increased and prolonged. In 1901 Takamine isolated suprarenalin, and in 1905 Einhorn discovered novocain. In order to use novocain efficiently and safely, its mode of action must be understood.

If a solution of lower osmotic pressure than the tissue fluid be injected, salts will pass out of the cells into the solution and water will pass into the

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cells. A degree of tissue damage will occur and at first pain will be felt; later anesthesia will appear. Hyperosmotic solutions also produce pain and then anesthesia. In each instance the degree of pain and subsequent anesthesia vary directly with the degree of departure of the osmotic pressure from that normal to the tissue fluid. If an isotonic solution of an indifferent salt, such as sodium chloride be injected, no tissue damage or changes in sensation occurs. Anesthesia by tumefaction, because of the preliminary pain and damage to the tissues is no longer used by surgeons.

Novocain solutions should depend on their selective effect only, and be made isotonic with sodium chloride or other neutral salt. "Cocain and its derivatives are protoplasmic poisons that have an intensely selective action on nerve tissue, paralyzing its function without nerve damage in dilutions too weak to affect other tissues." Novocain in solution, when injected subcutaneously, diffuses partly into the tissue cells and partly into the blood stream, the rapidity of absorption varying directly with the concentration of the solution and with the vitality and activity of the circulation of the part. The slower the circulation, the greater will be the proportion of the novocain assimilated by the cells and the less will be the amount circulating in the blood stream. Novocain forms a loose chemical combination with protoplasm without permanent damage. When this combination breaks up, the novocain disintegrates into its component molecules and so does not enter the circulation as novocain. Therefore, the slower the absorption by the circulation, the greater will be the tissue combination and consequent local anesthesia and the less the general effect.

Dilute solutions, by reason of their slower osmosis, are much less toxic than concentrated solutions. .005 gm. of cocain per kilogram will severely poison a rabbit if given in 5 per cent solution intravenously, whereas poisoning will not occur if six times as much, or 0.3 gm. per kilogram, is injected in .25 per cent solution. Neither does poisoning take place if .03 gm. per kilogram in 5 per cent solution be divided into fifteen doses and administered at five-minute intervals, although one-third of this amount, or .01 gm., will produce instant death if given in one dose.

It is evident, therefore, that the occurrence and intensity of cocain poisoning depend on the concentration of the drug in the capillaries of the central nervous system, and if the drug enters the circulation slowly and well diluted, the tissue cells absorb and disintegrate it before concentration becomes greater than the central nerve cells can stand without paralysis.

The subcutaneous fatal dose of cocain is ten times the fatal dose given intravenously. A 5 per cent solution of cocain containing .1 gram per kilogram of body weight when given hypodermically is fatal, whereas the same dose given in 1 per cent solution produces practically no symptoms. It is necessary to inject five times more the amount of cocain in a .2 per cent solution than a 5 per cent solution to produce poison. Novocain is 1/10 as toxic as cocain, but must be used in twice the concentration to

obtain the same local effect. If .01 gram of cocain be injected intravenously into the hind legs of two rabbits and the legs of one be ligated with a rubber band, the rabbit with the unligated legs will die in a few minutes, while the other will show no symptoms even if the band be released at the end of one hour.

*We can thus understand the value of suprarenalin when added to a solution of cocain or novocain. It slows the circulation of the part into which it is injected to an extraordinary degree, and acts in the same way as the elastic ligatures of the above experiment, retarding the absorption by the circulation and increasing the osmosis into the tissues so that the local anesthesia becomes greater and more prolonged and the danger of general poisoning minimized.*

The precautions that must be taken to prevent general poisoning are therefore evident:

(1) The dilution of the novocain must be as great as possible, consistent with sufficient concentration to suspend the function of nerve tissue.

(2) The solution must be held in the tissues long enough for the novocain to combine with the protoplasm. Suprarenalin or ligatures will accomplish this. The amount of the suprarenalin should correspond with the total amount of the novocain and not with the quantity of solution. Practically for every gram of novocain there should be .001 gr. of suprarenalin, and no more than .001 gm. should be used.

(3) The injection should be made very slowly, partly to prevent forcing the solution into the circulation by filtration and partly because experiments show that solutions injected slowly are less toxic than those injected rapidly.

(4) Great care must be taken not to inject the solution directly into a vein. The needle should be kept constantly moving while the injection is being made. If this is not possible, the needle should be inserted without the syringe; if no blood flows it should be slightly withdrawn and the syringe attached; while the fluid is being forced in, aspiration should be done at intervals to make sure that the point of the needle has not been thrust into a vein. These precautions are especially necessary in the caudal canal or in the neighborhood of the vertebral column, where the venous plexus is rich and absorption therefore rapid.

(5) Solutions should be made osmotically indifferent so as to avoid tissue damage and slow healing.

(6) If suprarenalin be added, care must be taken to use a fresh solution, which should be discarded if it shows the slightest discoloration. Tatum, Atkinson, and Collins have shown that veronal and paraldehyde are antidotes to cocain poisoning. If they bear the same relation to novocain, their administration prior to operation under local anesthesia may prove to be of value.

There is much disagreement concerning the extent to which local anesthesia can be used in abdominal surgery, some reserving it for exploration in extremely ill patients, and others using it throughout all their operations.

In 1866 Richardson did a Caesarean section by

freezing the line of incision with his ether spray; in 1898 Von Miculicz opened abdomens by infiltrating the abdominal wall by the method of Schleich.

In 1907 Lennander demonstrated that the abdominal viscera are almost insensitive to surgical trauma. In 1912 abdominal operations were first done under paravertebral nerve block.

In the same year Finsterer did extensive gastric and intestinal resection by injecting the base of the mesentery. In 1918 Kappis described splanchnic anesthesia by the posterior route, and a little later Braun advocated the anterior approach.

The greatest problem in local anesthesia of the abdominal cavity is the anesthetization of the posterior peritoneum.

The retroperitoneal tissue of the abdominal parietes everywhere contains a very rich plexus of sensory nerves. The slightest injury, rubbing, cutting, pinching or pulling of the parietal peritoneum is therefore very painful. The least traction on the mesentery always produces pain, but whether this is due solely to pulling on the peritoneum and retroperitoneal tissue at its base, or in part on special cerebrospinal nerves that pass through the greater and lesser splanchnics, is still not certain.

The major portion of the parietal peritoneum is supplied by the last seven dorsal, all the lumbar, and the upper sacral nerves. It is easy to anesthetize the anterior and lateral parietes by direct infiltration, but not so easy to reach the posterior peritoneum.

It is possible to anesthetize the whole peritoneum by paravertebral block, but the numerous punctures necessary and the danger from depositing a large amount of concentrated solution near the spine have caused this method, except in certain operations, to be abandoned.

Kappis, Finsterer, Braun and others believe that the mesenteries and viscera are supplied with sensory fibers through the greater and lesser splanchnics by way of communicating fibers from the sixth to the twelfth dorsal nerve, and claim that by blocking these in front of the first lumbar vertebra, operations on the stomach, duodenum, upper ileum, and biliary tract can be done without pain.

Recently, however, Meeker of the Mayo Clinic did a series of forty-two operations on the stomach, duodenum, and gall-bladder, using splanchnic anesthesia, and contrasted them with a similar series in which only the anterior abdominal wall was infiltrated.

General anesthesia during part of the operation was necessary in some of the operations in both series; but of those done with splanchnic block 38 per cent required gas or ether, as against 28 per cent of those in which the splanchnic area was not injected.

Meeker, however, used only 30 cc. of one per cent solution, as contrasted with 100 cc. of one per cent used by Kappis and Braun, or 75 cc. of one-half per cent by Finsterer.

Experiments by Meeker showed that 30 cc. was enough to infiltrate the splanchnic nerves, and from this it seems probable that the larger injections, which seem so successful in the hands of European

surgeons, act by saturating and anesthetizing the peritoneum and retroperitoneal tissue at the basis of the mesenteries, and not by blocking the splanchnic nerves.

The peritoneum of the pelvis is easily anesthetized by transsacral, caudal, or preferably presacral block.

The surgeon must remember that novocain inhibits the conduction of pain before that of touch, and that the apprehensive patient will often be greatly disturbed by being conscious of the surgeon's manipulations within the abdomen, though they do not actually produce pain.

The greatest possible gentleness is thus necessary, and all motions must be deliberate and slow.

Sudden traction must be avoided and care be taken not to pull ever so lightly on the parietal peritoneum or the mesenteries beyond the anesthetized areas.

Forceful thrusting the intestines from the operative field by gauze packing and a strong arm must not be attempted, and is usually unnecessary because if the anterior wall is thoroughly infiltrated and the incision of ample length, the intestines will fall away as in a cadaver; then by posture and very gentle elastic or spring retraction and packing the necessary exposure can be made.

From the moment of the first skin prick, every possible care must be taken to avoid causing the patients sensations of touch or pain. Every additional hurt or discomfort helps to break the patient's courage.

If in the course of the operation the surgeon sees that the next step will produce pain, a small amount of gas or ether for a few moments will enable the patient to go through the subsequent painless steps with equanimity.

A tactful anesthetist, by distracting the patient's attention, can do much to avoid general narcosis, and if properly trained can keep the patient relaxed with an extraordinarily small amount of the anesthetic when the tissue has been properly infiltrated.

When a general manual exploration of the abdominal cavity is necessary, gas should be given while it is being done. The freeing of adhesions and the delivery of organs sometimes, but not always, require transient general anesthesia.

For example, in fifteen of our recent gall-bladder operations local anesthesia was used. Of these, nine required no general anesthetic; yet only two of the nine were free of adhesions.

One of the six requiring general was a neurotic patient who, in spite of splanchnic block and thorough infiltration of the abdominal wall, required very deep anesthesia to remove a nonadherent gall-bladder containing no stones.

The majority of appendectomies during the interval can be readily done under local anesthesia.

In acute appendicitis we have usually found it necessary to give gas while the organ is being separated, if adherent and delivered. For its actual amputation and for closure, gas is unnecessary.

The patient often complains of severe colic at the most gentle attempt to lift up the colon, and may state that the pain is the same as that he has been having in his attacks.

Gastro-enterostomy, or even gastrectomy, can often be done by anesthetizing the area of the incision in the anterior abdominal wall. The incision must be so long, however, that no traction is necessary.

In our service we have made but little use of splanchnic block, preferring flooding the posterior peritoneum when accessible, as in gall-bladder operations, or infiltrating, if necessary, the mesentery in gastric or intestinal operations.

However, of the four cholecystectomies in which we used the splanchnic block, no general anesthetic was needed in three. The fourth was a flat failure.

Surgery of the pelvic organs can be readily done under transsacral or presacral block. This method is particularly useful in removing large tumors in very weak patients. The anterior abdominal wall is flaccid and the intestines have been displaced by the tumor, so that after delivery no painful packing is needed. We removed a twenty-five-pound fibroid from a woman 75 years of age with a blood pressure of 225; and from a woman of 50, two ovarian adenocarcinomas which greatly distended the abdomen.

Neither complained of discomfort during the operation, nor had the slightest shock following.

When ample exposure must be obtained by packing as in the usual pus-tube case with extensive adhesions, we believe general anesthetic the method of choice with, however, thorough blocking of the anterior abdominal wall for the purpose of minimizing the amount of gas or ether used and making relaxation more complete. (In young, vigorous patients we prefer ether.)

In certain of the acute abdominal diseases, in which the patients are very ill or are in shock or collapse with low blood pressure, local anesthesia has its greatest value, especially when associated with blood transfusion or dextrose and insulin injections.

Appendiceal abscesses, perforating ulcers, empyema or partial gangrene of the gall-bladder and intestinal obstruction come in this category.

All operations on old people are more safely done under local anesthesia. In young dogs McNider has shown that ether anesthesia produces no disturbance in the acid base balance of the blood, and but little change in the amount and character of the urine or the elimination of phenolphthalein.

In dogs over 4 years old, however, a two-hour etherization markedly reduces the alkali reserve and phenolphthalein output, and causes the appearance of albumen and casts.

In intestinal obstruction evisceration can be safely made through an ample incision. A stimulating dose of ether for a few moments is here very useful.

The advantages of local anesthesia in abdominal surgery are: (1) It eliminates shock. (2) Vomiting is almost entirely absent. (3) Intestinal atony and gastric dilatation are but rarely observed. (4) Peritonitis is less frequent. (5) Mortality from pulmonary complications does not occur.

Pulmonary morbidity is apparently as frequent as in operations under general anesthesia, but the

patients do not die. The statistics to this effect are abundant and convincing.

After any abdominal operation the painful wound hinders the patient in his efforts to expel the stagnating bronchial secretions in which bacteria grow.

If anthrax bacteria be smeared on the laryngeal mucous membrane of rabbits anesthetized with chloroform or ether and the anesthetic be stopped before fifteen minutes, the animals will live, but after one hour's anesthetization will perish from anthrax pneumonia. This lowered resistance of the tissues presumably accounts for the fatalities from pneumonia that follow long operations under ether anesthesia.

Following all abdominal operations, especially those on the gastro-intestinal tract, the patient should be urged frequently to expel the bronchial mucus while an attendant supports with his hands the abdominal wound.

(6) The necessity of speed is less in local anesthesia, and so in bad-risk patients more careful dissection and suturing can be done. (7) The careful handling of the tissues necessary is a most valuable training to the surgeon in what Sterling Bunnell has called atraumatic surgery. (8) Bleeding is less than under general anesthesia. (9) Post-operative acidosis is much less following local than general anesthesia.

#### DISCUSSION

FRANK R. GIRARD, M. D. (Flood Building, San Francisco)—Regional anesthesia is now one of the permanent methods of anesthesia. About this there can be no question. As the technical skill required for this form of anesthesia is better developed, especially in our younger men, we are going to see a steady increase in the use of this form of anesthesia. Up to recently, local anesthesia was considered useful only in minor operative procedures, but its greatest field of usefulness unquestionably is in the gravest major surgery.

Doctors Ryfkogel and Carlson have shown this very clearly in their excellent presentation of the subject. I am in hearty accord with the statements made by the authors, and in my own work have been doing an increasing number of major operations under regional anesthesia each year.

The lack of shock and general well-being of patients after prolonged and serious operations performed under local anesthesia, with or without a little nitrous oxide, stands out in a dramatic manner when compared with the same operation performed under ether. This I attribute not so much to the kind of anesthesia used as I do to the fact that under local anesthesia only the gentlest manipulations are permitted by the patient, and surgeons working with local anesthesia become expert in handling the tissues with the greatest care and gentleness. It is too bad that the same gentleness is not used when operating under ether, but unfortunately such is often not the case.

For some time past I have been giving to nervous, apprehensive patients scopolamin and morphin before operation. Scopolamin gr. 1/150, morphin gr. 1/6, one hour before the operation is begun. In very nervous patients I occasionally give an additional dose of scopolamin, gr. 1/200, but no morphin one-half hour after the first dose.

Following this treatment, the patients arrive in the operating-room quite drowsy, but they can be awakened. The preparation of the site of operation and the injection of the novocain cause little or no disturbance, and I have frequently done extensive operations on the gall-bladder, stomach, and intestines, with no other anesthetic than that injected into the abdominal wall. It must not be construed from the above, however, that all patients respond like this. I make it a rule to have a gas machine and anesthetist at the patient's head, to be used, if only

for a few moments, whenever the patient shows signs of objecting.

I wish to commend the authors for bringing the subject of regional anesthesia to our attention in such a clear and forceful manner, and I hope that their work may enthrust others to go and do likewise.

A. H. ROSBURG, M. D. (Flood Building, San Francisco)—The authors have covered the subject of regional anesthesia in abdominal surgery well, and I feel that there is very little or nothing for me to add; however, a few words on the salient points of this paper might help to convert some of our ether-pouring friends to the use of this most wonderful method of anesthesia and incidentally save a few lives.

I think that most surgeons will agree that an ether anesthetic given by a well-trained anesthetist and not lasting longer than one hour is a fairly safe anesthetic, but if given over a longer period of time certainly becomes an outstanding etiological factor in the production of post-operative pneumonia.

In the hands of well-trained surgeons regional anesthesia with or without gas and oxygen, and a little ether while closing the peritoneum, is in my opinion the safe, ideal and beautiful anesthetic both for the patient and the surgeon.

As stated by the authors of this paper, the patient often develops post-operative pneumonia in spite of the fact that no ether was given; but the pulmonary infection is of a low-grade type and the patient does not die. I wish to go on record with the authors that that has been my experience in more than a hundred cases.

It goes without saying that a well-trained anesthetist, whether gas and oxygen is to be given or not, must be present at the head of the operating-table during the entire time of the operation. His duty is to watch the pulse, respiration, color of patient, etc., and to engage the patient in some interesting conversation not related in any way to surgery. This part of the operation is as important as the novocain itself. I once performed a herniotomy on a boy 10 years old under regional anesthesia and, although he admitted that he was having absolutely no pain, he became so nervous and hysterical that I was just about to call an anesthetist to give the boy some gas and oxygen, when a young orderly happened to come into the operating-room and engage the patient in a conversation about baseball. A whole can of ether or a whole tank of gas couldn't have quieted the patient any better than did this orderly. Since that time I have always asked for an anesthetist, whether the anesthetic is to be general or local or both.

The solution used should never be over .5 per cent strength novocain with four drops of the stock solution of adrenalin to the ounce of solution added. I am convinced that one can inject as much as 500 cc. into an adult at one time with perfect safety. The anesthesia is much safer and much more satisfactory when a large quantity of a weak solution is used in place of a small quantity of stronger concentration. If you inject large amounts of a weak solution of novocain in or near the right place, you will always have good anesthesia.

A most important point brought out by the authors, and often not thought of by the surgeon who uses local anesthesia only occasionally, is to keep the needle moving constantly while injecting the solution in order to avoid injecting any large amount into a blood-vessel, as novocain in any strength injected into the blood stream is very toxic.

It has been my experience that better anesthesia is obtained when the splanchnic area is injected than when only local infiltration of the peritoneum is done. The difficulty is that it is often impossible to inject the splanchnics without causing considerable pain by the necessary manipulations. In these cases I like to give a little gas and oxygen for a few seconds while the injection is made, allowing the patient to awaken just as soon as the infiltration has been finished.

Morphin and atropin should be given before the operation in the same manner that it is given before an ether anesthetic. The use of morphin and scopolamin in repeated doses to produce the so-called twilight sleep is not very satisfactory, and carries an element of danger. It could be used with regional anesthesia with great

success if we had trained psychoanesthetists, noiseless surgical instruments, quiet assistants, and all the other requirements that go with good twilight-sleep anesthesia.

I have used regional anesthesia in several hundreds of abdominal operations, and have found that it is necessary to give a little gas and oxygen while injecting the splanchnics, as mentioned before, and while exploring the abdominal cavity; and to give a little ether in some cases while closing the peritoneum. It is always better to give a little ether in those cases where the abdominal cavity seems too small for its contents while closing the peritoneum than to waste a lot of time pulling and tearing the tissues.

I am glad that the authors brought out the fact that regional anesthesia in abdominal surgery teaches the surgeon to handle the tissues with care. No matter how well the region to be operated upon is blocked and infiltrated, the patient will not stand for any rough handling of the tissues.

Another great advantage of regional anesthesia over ether anesthesia, and one overlooked by the authors, is for the teaching of operative surgery. It takes a good experienced surgeon from ten to thirty minutes to do an appendectomy or a herniotomy. An ether anesthetic given for that length of time would probably harm no one. An inexperienced intern requires from one to two hours to do either one of these operations. An ether anesthetic given for that length of time is injurious, and one would naturally feel that the patient was not getting a square deal by having an intern perform the operation. By using regional anesthesia that danger is done away with, and the poor struggling intern who must get his first experience some time, although a great many surgeons don't seem to think so, is given a chance to perform his first operations under the supervision of a good surgeon.

I wish to compliment the authors on the concise way in which they have presented their paper and want to thank them for having asked me to discuss it, as I have been deeply interested in regional anesthesia for several years. Although I feel that I have added very little or nothing, I hope, together with the authors for the sake of humanity, that their most timely paper on one of the most important branches of medicine and surgery will bear fruit. We still have too many users of ether; and the sad part of it all is that the majority of these same surgeons are slow operators. A sad combination, to say the least.

A. B. COOKE, M. D. (1019 Hollingsworth Building, Los Angeles)—If local anesthesia is ever to come into its own, it can only be when its relative safety and reliability in the hands of the average surgeon have been definitely established. This is not the case at the present time. Ryfkogel and Carlson represent the exceptional rather than the average.

Employed by the novice, the methods advocated all possess an appreciable element of danger. Even the well-trained surgeon, unless he has perfected himself in the technic of their use, cannot expect more than indifferent success.

I can think of only two means of really advancing the cause of local anesthesia:

First: The anesthesia specialists should realize that local anesthesia is not only an important but an essential part of their specialty and qualify themselves accordingly, so that the surgeon would be able to select this method when indicated, as now he specifies gas or ether for the case in hand.

Second: The recent graduate who finds himself attracted to surgery should recognize the increasing prominence of local anesthesia with the public as well as the profession, and devote himself to the mastering of its technic.

That local anesthesia actually possesses the advantages enumerated by the essayists, is beyond dispute. The fact that it exacts the most scrupulous gentleness in every stage of the operative work is alone sufficient to counterbalance all difficulties and disadvantages.

I am not so enthusiastic as to believe that the method is best for all or even the majority of cases. Certain types of patients and certain kinds of cases will probably always be better handled under general anesthesia. The

psychic factor cannot be ignored. For example, I am convinced that a highly toxic goiter is far better attacked with the patient's consciousness abolished in a large proportion of cases.

The paper of Doctors Ryfkogel and Carlson is an admirable presentation of the subject, and all the more so because it is based on their own personal experience.

#### CLOSING OF DISCUSSION

DOCTOR RYFKOGEL (closing)—If the several simple precautions detailed in our essay are taken, local anesthesia is much less dangerous than any general anesthetic, especially if the remote as well as the immediate effects are considered. That its use requires training and experience is, of course, true, but this applies to all surgical procedure.

In recent months some who represent cults or quacks have sought to secure publicity by challenging members of the medical profession to debate such questions as, "Does Smallpox Vaccination Prevent Smallpox?" "Do Sera Benefit Humanity?" "Has Animal Experimentation Been of Benefit to Science?" Whether or not smallpox vaccination or diphtheria immunization are effective, are no mere academic subjects to be settled by the shrewd dialectician. They are matters which have been scientifically demonstrated. Unfortunately, many who attend such debates are not seekers after knowledge, but partisans whose opinions are fixed. A debate merely shows which of the contestants is the shrewder, wittier or more adroit. If the defender of a truth has feeble skill, it in no wise minimizes such truth. We are of the opinion that no effort is too great to instruct or to counsel, but we count it a loss of time and energy to merely stage a verbal contest.—Department of Health Weekly Bulletin, New York.

It takes ten or twenty years for a knowledge of new discoveries and medical standards to be understood and accepted by laymen. The people are a generation behind the times in their knowledge of what can be done for the mentally sick, and physicians usually have great difficulty in getting the patients and their families to accept the diagnosis of mental trouble that is plainly evident to the doctors. The popular opinion of a mental disorder is that it is a disgrace which is to be concealed as long as possible. The opinion is similar to that regarding tuberculosis twenty-five years ago. Physicians have the opportunity to change that opinion, just as they have educated the people regarding tuberculosis.—New York State Journ. Med., June 1, 1926.

We survey the dwindling American family and moan and beat our breasts. "Grandma," we say, "had fourteen children, and today three are considered a houseful." We forget that the fourteen children were assets to grandpa just as soon as they could pull weeds, while the three contemporary blessings are liabilities. We also overlook the new fact that under urban conditions poverty and infant mortality go hand in hand. Our cities were not planned, they just grew. If the average American family today comprised ten children, uncounted thousands of them in cities would be doomed to early death. And we cannot now help that, for we face a great many decisions about cities that we rendered long ago by default.—Chester T. Crowell.

Of all hospital beds, the proportion controlled by the national government has increased from 2.1 per cent in 1909 to 2.3 per cent in 1914, 3.1 per cent in 1918, 6.8 per cent in 1923, and 7.1 per cent in 1925. There are now 299 hospitals maintained by the national government with a total capacity of 57,091 beds, of which an average of 42,377, or 74.2 per cent, are constantly occupied. These figures cover the hospitals maintained by the United States Army, Navy, and Public Health Service, the Veterans' Bureau, and several hospitals for government beneficiaries located in the District of Columbia and elsewhere.—J. A. M. A.

## INDUSTRIAL LIABILITY FOR CANCER

By ALSON R. KILGORE AND CURTIS E. SMITH \*

*It has become the practice of commissions to hold occupational injury responsible for cancer under certain conditions.*

*These conditions have been laid down and generally accepted by authorities, and compensation should be awarded as the conditions are or are not fulfilled in individual cases.*

*Insurance carriers should protect themselves as well as the employee by insisting on repeated examination after the immediate effects of trauma have cleared up in all cases of injury of a type likely to result in cancer. If cancer is demonstrated as soon as the swelling of contusion has gone down, the inference of pre-existing cancer can be made and injury absolved from responsibility for starting the growth. On the other hand, if cancer does develop it may be found early enough to make surgical cure possible. These considerations are especially applicable to the breast.*

DISCUSSION by Charles E. von Geldern, Sacramento; Philip Stephens, Los Angeles; R. W. Harbaugh, San Francisco.

THERE seems to be no way in which it can be scientifically demonstrated that injuries cause or do not cause malignant tumors to develop. With the exception of the use of certain chronic irritants (usually chemical), we know of no successful attempts to produce tumors experimentally by trauma. And, in view of the frequency of spontaneous tumors and the always present possibility of simple coincidence, it is unlikely that we shall soon be able to obtain positive proof that any individual human tumor has arisen as a direct result of injury.

There is, however, certain evidence based on observation and experience, from which deductions may be drawn for practical medico-legal purposes:

(1) The conversion of a benign lesion into a malignant one by a single trauma. The best example of this is the pigmented mole, changed into malignant melanoma by the injury of incomplete surgical removal. The fact that this occurs is partly to blame for the popular notion that pigmented moles should not be disturbed, inasmuch as laymen have observed the development of hopeless cancer after such moles have been cut into, part of the mole being left.

A still more interesting example of this change, though one not so commonly observed, is the development of sarcoma from the myxoma of bone when disturbed without complete removal. The cells of myxoma of bone implant in surgical wounds probably more constantly than is the case with any other tumor tissue, and while the primary, undisturbed myxoma does not usually metastasize, the recurrences after implantation or incomplete removal change their cellular character definitely into that of sarcoma and metastasize with great constancy.

(2) The development of cancer at sites of chronic irritation. This is so common as to be generally recognized, the irritation being either mechanical,

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